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It is with an unusually deep sense of appreciation that I deliver to you today the annual address of your President. This association was founded by, and during its early life consisted almost exclusively of, medical men, until within recent years men of other activities were called upon to assist upon the fields of public health. Among the new professions thus entering this domain was that of sanitary engineering. For the first time in the history of the association your President has not been a physician, but an engineer. This recognition of the engineering profession by calling it into partnership in the deliberations concerning public health questions has been greatly appreciated by it, and I desire to express this fact, and to add that this partnership with the engineer, whose duties embrace the practical ways and means of carrying into useful effect the results of medical science so far as they apply to public health, should result in large benefits to our people. And, personally, I cannot adequately express my feelings as to the depths to which I appreciate the confidence and the honor you have placed upon me by selecting me to represent my profession in this common cause. I can but devotedly thank you for this most highly prized distinction.

The engineering profession, in directing the application of the various materials and sources of power for the use, convenience and health of man, has in the last century proceeded with greater speed and vigor than ever before. The reason is, as Professor George F. Swain has said, that the engineer is an applied scientist, able to furnish necessities, comforts and even health to our people to an extent of which former generations never dreamed of nor thought possible. Engineers are, therefore, being brought in to help in directing aright the tendencies of the day. Based only upon known laws of nature, engineering has a firm foundation. Whether for sanitary or commercial purposes, it should, therefore, be reliable and make a safe partner in the field of public health.

Our entire social organization is in many ways now undergoing a bloodless revolution, and, as knowledge advances, readjustments are continuously being made. Education is being better understood and our youth is placed in a better position to attack the problems of life and to do it from more solid and safer bases than was formerly possible. Religion is becoming broader and more generous. It is extending into the field of practical ethics more rapidly than ever before, to point out the best rules of conduct within family and community. The realm of faith is making room for positive knowledge and this, again, is building a foundation for the belief that we are constantly progressing towards the highest ideals for which the human race is struggling.

As to our theories of government, we have lost those strong antagonisms between monarchy and democracy. Today empires and republics can hold and maintain faithful friendships. The most wonderful changes of all are found in the fields of industry. The harnessing of the powers of nature and their utilization for the needs of man, both for manufacturing and for transportation, has changed civilized life more than any other factor has done. The developments of production, of the means of transporting people and wares on land and water, have been marvelous, and that of transmitting our thoughts and desires by bridled electricity from one part of the earth to another is simply astounding. This rapid progress, due to advanced knowledge, is pervading every phase of civilization. It has also pervaded the realm of public health.

Let us go back for a moment and briefly review the history of public health. Hygienic regulations existed among the most ancient peoples. Moses took his prescriptions from Egypt and India. The Greeks were the first to introduce public water supplies, to dispose of refuse, to keep the human body clean by public bathing, and strong by concerted exercise. The Romans went still further, controlled the healthfulness of their food, introduced sewerage and better disposal of the dead. In the first thousand years of the Christian era of Europe, hygiene retrograded gradually until the twelfth and thirteenth centuries, when England and Germany began to control pestilence in the larger cities. In the fourteenth century some attention was beginning to be paid to general town cleaning, to food adulterations and to the systematic removal of excreta. In the fifteenth century at last there began the great modern uprising in the interest of public hygiene. The city of Venice, commercially the leading city of the world, established the first municipal organization for the protection of public health. Then followed slowly the larger cities of Germany, England and France.

The first attempts at public health service in the United States seemed to have been in Virginia in 1739 but were limited to regulating the practice of medicine and to the registration of vital statistics. Then came the

official sanitary activity in Boston, brought about chiefly by smallpox. On May 27, 1796, a national law authorized the President to "direct the revenue officers and the officers commanding forts and revenue cutters to aid in the execution of quarantine and also in the execution of the health laws of the states."* One year later Massachusetts established the first town board of health and set the pace which has since covered almost the whole country.

At the time this association was formed—it was at a meeting of medical men in New York on September 12–13, 1872—the prevailing means of guarding public health were by quarantine, segregation, vaccination and cleanliness. Soon thereafter bacteriology developed and a new era of public health service at once was started. A number of infectious diseases were found to be caused by extremely small organisms which entered the body. An enormous multiplication therein produced the diseases, and when these had run their course, the organisms departed, ready to enter another body and repeat their destructive work. This discovery not only facilitated effective treatment and cure, but also the prevention of infection, which brought about achievements in the public health service that had never before been equaled.

The cause and treatment of yellow fever, that most dreaded of all infectious diseases of this continent, are now known, and no repetition of its destructive epidemics of the last century need be feared hereafter. We can say almost the same of cholera and bubonic plague, those morbidic terrors which have on several occasions decimated European city populations.

Diphtheria has also in a large measure become controllable so that its rate of reduction due to an antitoxin treatment is phenomenal. Let us hope it may be but a short time before measles, scarlet fever, whooping-cough, mumps and other similar infectious disorders can be similarly controlled. The hook worm disease of our Southern States, much dreaded a few years ago, is now on the road to be eradicated. Typhoid fever can be very largely reduced and almost annihilated by supplying pure water and milk, by excluding from the market all polluted shell-fish, by cleanliness in food exposures, by fly elimination, by disinfection of fresh typhoid excreta, by supervision of human typhoid carriers and by vaccination as developed in the army camps of Texas.

The largest groups of preventable diseases yet remaining under some clouds of ignorance, because a direct remedy is not yet known, are tuberculosis and pneumonia. But even here great results have been accomplished by knowing the causes, by eliminating the conditions under which the diseases are aggravated, and by selecting conditions under which they may be reduced.

*Public Health Bulletin, No. 54, by Dr. J. W. Kerr, assistant surgeon general.

Recent advances in the reduction of cancer and syphilis by bringing them largely under control make further advances towards cure more hopeful. Infectious diseases, one after the other, are being conquered, ignorance is being dissipated and scientific knowledge is gradually building up a firm and permanent structure of public health. If the advance in public health is measured by the lowering of the death rate, it has been marvelous, because in the most civilized countries during the last one hundred years it has been cut almost in two. Today there is a more widespread interest in the public health movement than ever before. There is a realization not only that large benefits have already been gained, but that still larger benefits will follow, because science has at last gotten a fair grasp upon the essential elements of the health problems, so that the sanitarian, instead of being obliged to base his efforts largely on faith, is now able to lead us through the still unknown territory, more rapidly and more safely than formerly, towards the goal so longingly desired.

Science is entering into more and more branches of activity. It has spread from physical activity to organic life, then into the realm of psychology and is now leaping into sociology, where it promises eventually to regulate and control our conduct towards each other by natural law.

Professor Swain says: "As long as there are masses of men who are shiftless, lazy, incompetent and vicious, whom nobody would willingly employ, poverty will exist." Poverty and ignorance are the two great causes of unsanitary conditions and both lead towards sickness and death.

Harris says: "The prevention of poverty is to be found in good sanitation enforced by the municipality, in suitable education of individuals according to capacity, and in self-help rather than in economical revolution."

Homer Folks, in his excellent discourse on "The State as a Life Saver," says: "Life is the supreme gift. Life saving is the highest and noblest of pursuits." "How far is our present knowledge of life saving applied? What are we, all of us, acting through government, doing and what further can we do to save life? These are among the biggest questions of the age."

The growing interest in sanitary science is reflected also by this association, whose members, selected from the best men our continent affords, have organized for progressive work. The speed with which progress is being effected in other civilized countries makes it necessary to accelerate our own work, increase our efficiency, and thereby multiply our results. To accomplish this requires a well defined program.

Let us look over the hygienic field and make a survey of what we are doing and of what we shall yet be obliged to do. For this purpose we can conveniently divide the field into four parts: Hygienic Data, Applied Hygiene, Hygienic Education and Hygienic Legislation.

I. HYGIENIC DATA.

Hygienic data are the fundamental elements upon which public health work is based. They relate to individuals and to the family. I shall group them as follows:

1. Vital statistics.
2. Infectious and communicable diseases, including infant mortality.
3. Disease carriers.
4. Eugenics.

1. In order to make our vital statistics most useful it is necessary to have methods or records which will give us the desired information in the best practicable manner. At the present time this result is not completely obtained. It is pretty generally recognized that reform is required, and it is also necessary to have the taking of statistics extended over the entire areas of our countries. At present the registration area in the United States covers hardly two thirds of the entire population. Unless our statistics are fairly complete and satisfactory, deductions from them will correspondingly lack in force and make further progress difficult.

Vital statistics, in Europe as well as here, are slowly being profitably extended to morbidity. It is valuable to record not only the fatal cases of disease, but also those which may not be fatal. The public health service should primarily endeavor to prevent and control diseases, whether the patient ultimately recovers or not. Whether during the recent public health movement morbidity has been reduced as much as mortality can only be surmised. We believe it has been reduced much more, but statistical facts are needed to prove this belief. While in the middle ages sickness was so common that the customary greetings in almost all nations, some of which have descended to this day, was an inquiry regarding one's personal health, we have reached a stage where in healthy families a case of sickness has become comparatively rare.

The records of vital statistics, if they are to indicate the public health status, are about as important as bookkeeping is to indicate the condition of a business. In both cases we must have a correct understanding of the figures. At present there is a wide-spread misunderstanding regarding public health figures. To illustrate, let me first quote one of our members, an officer in the Bureau of Statistics in Washington:

"There is probably no form of untruth which is as vicious as that of figures, because the public regards what it sees in statistical form as being mathematically correct, never stopping to think of the origin or rationality of the figures. Thus there has been a set of statistics regarding lunacy going the rounds which, while true so far as they go, tell only one portion of the truth. The resulting impression made by these figures is that the

whole nation is lapsing into lunacy and that within thirty years a sane man will be a freak fit for a dime museum."

The explanation of this anomaly lies in the simple fact that the records of today are more complete and cover more cases than formerly.

We find in some districts that the death rate in large cities has decreased while the rural death rate has increased. We should not necessarily conclude from this fact that the rural life is becoming less healthful. Some of the increase of city population is due to immigrants from the country, being of middle age and in the best of health. In the country there is left behind both youth and old age, in both of which the mortality is greater than in middle age.

Let me illustrate another anomaly from my home town, Montclair, N. J., with a population of nearly 25,000. Its death rate in 1912 is recorded as having been 9.83 per 1,000. If every person lived to be 100 years old, then among a thousand inhabitants 10 would die every year. The death rate would, therefore, be called 10 per 1,000, and yet in Montclair the death rate is less, as though the average life of its inhabitants was over 100 years, a conclusion no more absurd than the one that healthfulness is indicated by a low death rate.

Let me explain this anomaly by an exaggerated statement. Suppose there is an immigration into a town of strong and healthy men and women sufficient in number to double the population within a year. The general death rate per 1,000 at the end of the year might, therefore, drop one half without any change whatever having occurred in the healthfulness of the locality or in the administration of the town.

Consider the reverse case, namely, that the most vigorous half of a community emigrates from the town, leaving the weaker half behind. As nearly all the deaths occur among the weaker half, the general death rate after a year would, therefore, have practically doubled without any change in the local conditions. In short, immigration and emigration very materially affect the figures now used to indicate the death rates.

There is still another misinterpretation of the annual death rates that has been going the rounds. As all persons must die, the death rate irrespective of age must be 100 per cent. If we reduce the rate in youth, which, during the last few decades, has been so successfully done in civilized lands, then it must surely be correspondingly increased in older age. If no persons should die under 40, then all would have to die over 40. In other words, the fewer deaths when young, the more deaths when old. Instead of being alarmed by this increase of the old age death rate we should be pleased. While modern sanitation, due to better public health service, has reduced the unnatural death rate of the young, it has increased the natural death rate of the old, and has thereby enabled a large percentage of persons to live a longer life and more closely approach the age limit when all persons

must die. Some cities now group the deaths into decadal periods. This is a simple way of overcoming some of the anomalies above mentioned and the practice should be extended. However, until we can take account of immigration and emigration during the same decadal periods, we will still have death rate figures which do not indicate the general healthfulness of the people or of the locality. The elimination of misleading vital statistics and the adoption of uniform methods of recording would be very helpful in reaching more correct conclusions regarding sanitary improvements than is possible at present.

2. The second group of hygienic data in the discussion of public health comprises infectious diseases and infant mortality. Only a few words need now be added to what has already been said regarding the progress that has been made in the control of such diseases.

Research must be vigorously continued if we would discover the causes of all those infectious diseases which cannot yet be controlled. The public health service should carefully keep track of such progress, and at once employ the best means and ways to combat the spread of such diseases.

Tuberculosis is in most civilized countries the cause of the greatest number of deaths. The cause of tuberculosis is known, but the means of positively exterminating in our bodies the specific bacillus, so far as its fatal effect is concerned, is not yet known. But present knowledge indicates the direction, by palliative treatment, along which a cure or an arrest may be expected under certain conditions. This most prominent of all fatal diseases has, therefore, lost some of its former terror, and it is not improbable that we may expect to see also this blight upon our development conquered in the possibly near future.

Pneumonia, another frequently appearing enemy, may also be largely prevented, controlled and reduced, although the entire story and its satisfactory ending cannot yet be told.

Infant mortality is another most productive field for sanitary effort. Chapin believes that in Providence, chiefly by overcoming the ignorance of mothers, 200 babies have been saved in one year. Homer Folks says regarding the reduction of infant mortality, that "New York City has achieved in this respect one of the most notable triumphs in the history of public health."

3. The third group of hygienic data relates to disease carriers. Much could be said on this subject, but time allows only the remark that the public health service has no greater duty before it than to prevent disease germs from being carried from the sick to the well. We know today that infected water and milk, sputum and excrements from diseased bodies, raw shell-fish, rats, mosquitoes, flies and other insects, are the *real* dangers to public health. With this knowledge it has now become possible even to eliminate the causes of a number of diseases, so far as the conditions may permit.

Much more knowledge, however, is yet required to know the conditions under which pathogenic bacteria are slowly or rapidly developed and those under which they may be slowly or rapidly destroyed, in the above mentioned carriers, so that this knowledge can be applied most effectively and most economically in the public health service.

4. The last group of hygienic data is eugenics. In the previous groups we dealt with the individual as a factor in the public health service. In the present group we consider the other equally important factor for a social organism, namely, marriage, the procreation of offspring and the improvement of the race through improved conditions in the relation of the sexes.

No less important questions are here embodied than were mentioned in the previous group, because we should view the race questions with the same thoroughness as those which relate to ourselves as individuals. Public health service should concern itself also with the health of the family as the social unit. It should guide the public in controlling the conditions to improve the coming race physically, intellectually and morally.

We pay much attention to breeding stock, horses, cattle, dogs and cats, with the commercial object of improving them, but pay little attention to breeding the human race for the purpose of improving it. Marriage is still generally permitted among confirmed criminals, and paupers, and among physically as well as mentally diseased persons, which practice lets loose upon society a large number of degenerate and weak offsprings, not only for support by the public but to carry into the community intellectual and moral infection of all kinds. And this shocking condition is further aggravated by a higher birth rate recorded in the less desirable element of a community than in the better element, which caused Macauley to fear that the breeding of barbarians would some day destroy our civilization.

Is it not as foolish to permit this condition to continue, as to foster for no purpose a propagation of weeds, disease-carrying insects and dangerous animals? Is not this condition hygienically, socially and economically indefensible?

Effective and positive measures are required to increase among us the socially desirable traits. We are already endeavoring to suppress the means by which defective traits can be imported into our countries. We have also recently begun to adopt hygienic marriage laws in a few of our states, but barely a beginning has been made. In addition to the religious and legal phases of marriage, we need to establish also the scientific and medical phases.

The science of eugenics is gradually developing, and many people, who are thinking beyond the present and their physical surroundings, are falling in line with this new progressive movement, already fairly started both in

America and Europe. This association should, in my opinion, also take up this subject. A section composed of members most able to treat its various scientific and moral elements, preparatory to an appeal for suitable legislation, would render a service to the race, and keep the association abreast of another progressive movement of the day.

We have completed a cursory view of the principal hygienic data which relate to public health and constitute its foundation. This foundation, although sound, is as yet scant, and consists only of piers rather than of an extended base. But these piers are firm and fully justify us in proceeding to apply the data to our practical cases, and await the future to further elaborate the structure.

We can now take up the second part of the subject, namely, that of

II. APPLIED HYGIENE.

This may for convenience be divided into six groups:

1. Social hygiene.
2. School hygiene.
3. Industrial hygiene.
4. Municipal hygiene.
5. Railroad and navigation hygiene.
6. Army and navy hygiene.

Let us again consider hurriedly a few facts regarding some of these groups.

1. *Social Hygiene.*

The application of hygienic conditions to the social organism is quite extended and, strictly speaking, perhaps includes all of the other groups to follow. It is, however, here limited to those parts of the organism which are not specifically treated in the other groups, and are: parks and play grounds, facilities for exercise and bathing, facilities for intellectual and mental improvement, hygienic effects of the social relation, hospitals and other public institutions, and organization of health departments.

Social hygiene, outside of schooling, should be devoted chiefly to giving to the people larger opportunities for recreation in every healthful way. This recreation should be extended to physical, intellectual and ethical subjects. In our largest cities we are getting more and more opportunities for these extensions, with excellent results. Interesting topics for mental recreation have the same beneficial hygienic effect as interesting ways of physical recreation. Both in Europe and America more and more attention is given to these subjects.

Social hygiene embraces also the effects of the fundamental relation between the people and the social conditions under which they are placed. The health problems arising herefrom are being clearly recognized and

studied. Those in charge of the effects of such relationship should have a high intelligence and a large experience, in order to accomplish results that will be both permanent and satisfactory. But not only the well members of a community need suitable provisions to maintain their health, the sick and feeble must be given at least equal care. Hospitals, suitably planned and located and sufficient in capacity, must be provided wherever the hygiene of the social organism is to be kept at a high standard.

The whole subject as herein limited, in its physical and intellectual and moral aspects, is a fruitful field for further study and sound recommendations.

2. *School Hygiene.*

The interest prevailing at the present time in the subject of school hygiene is evidenced by the international congress just held at Buffalo. A glance at the subjects of the many papers read and discussed indicates its importance and the many phases of the subject which need further investigation, study and report.

School hygiene, besides its mental subjects, embraces the physical subjects of proper light, heat, ventilation of the buildings, of food and water, school books and charts suitable for young eyes, and disinfection of all materials previously used. It comprises suitably designed desks and chairs, and seats at such locations best serving the natural vision and hearing capacity of the pupil. Medical inspection has been had in some schools for many years. As yet there is no generally accepted practice, either regarding what is to be inspected or the methods to be employed. As from 6 to 10 years of our formative age is devoted to school life, and as many children are brought to school with physical defects, in perhaps one-third of the cases, the importance of the subject has long been recognized. Yet in practice a large number of the schools still lack an efficient inspection. Medical school inspectors and instructors should become as necessary as the present teacher, if the body of a child is to be properly prepared both physically and mentally for the coming duties of life.

All instruction should be given, so far as practicable, in a form to arouse interest in the subject to be learned. The result is a clearer understanding, and the effect upon the mind will be along more natural lines, and, therefore, more hygienic than if the interest is lacking. It will be similar to the acquisition of physical accomplishments, which, if encouraged by interest, always reach higher development than without it.

It is stated that from 5 to 10 per cent. of all children are born feeble-minded or mentally dull. For such unfortunates the communities should provide special schools so that they can receive adequate instruction according to their capacity, instead of entirely failing in the usual classes, where the larger percentage consists of more gifted children.

3. *Industrial Hygiene.*

Among the recently born factors in the public health movement is industrial hygiene. The closely crowded working man, the unhealthful materials used in some manufactures and the strain resulting from certain excessive nervous and muscular activities, all demand that such occupations be regulated by wise provisions, so as to prevent the creation of exhaustion or debility and of destruction of human life. About one half of the wage earners in the United States are engaged in the manufacturing trade and in transportation, and the high importance of the hygienic phases of their work as a public question, is, therefore, evident, and this new branch of hygiene is deserving of special attention. A movement seems to be already materializing to teach the subject in medical and technical schools under headings such as these: "Mechanical and Clerical Work and their Physiological Effects," "Treatment of Trade Diseases and Accidents," "Factory Fatigue and its Causes," etc.

Public health service applied to industrial hygiene becomes in a measure also an economical question. The financial value of good health is quite apparent to an industrial worker. Good health and a prolonged life means to him an economic gain. Western Europe leads us in preventive and protective measures for industrial labor. We in America need more investigation and study, of the somewhat different conditions prevailing in our country, before we can crystallize the best ways and means to protect our labor most efficiently, and finally to have rational and effective legislation.

4. *Municipal Hygiene.*

Municipal hygiene covers all those branches of a public health service which relate to a municipality, such as:

- Air and water supplies.
- Food supplies.
- Illumination and acoustics.
- Vehicles for city conveyance.
- Street and river cleaning.
- Disposal of the dead.
- Sewage, rain water and refuse removal.

Time permits but a few brief remarks concerning some of these subjects, and I shall pick out those which are most in need of further investigation before they can satisfactorily fulfill public health requirements.

The first subject, that of supplying suitable *air* to enclosed spaces, of heating, ventilating and removing foul air, is one which as yet is not sufficiently well understood in detail, and on which there are still opposing opinions. In fact, of all the branches of sanitary engineering at the present time it needs most investigation and most study.

Water supplies are of great importance to public health on account of the possibility of their being carriers, chiefly of typhoid fever and diarrhoeal diseases. The modern conclusion, which is being pretty generally accepted in the interests of public health, is, that all surface waters, except after long storage in fairly inaccessible places, shall be purified by filtration or other treatment, and that only ground or spring water, when palatable and not excessively charged with objectionable dissolved minerals, and when not receiving subsurface pollution, may be consumed in the natural raw state.

Great progress has been made in the economical disinfection of waters, by which, at least, the pathogenic bacteria can be destroyed at small expense in an otherwise clean water.

Food supplies also offer a field for more investigation and action, and is still one of the live questions before the people. It can be truly said that we are too often not served with the most healthful available food, nor do we receive it in the most economical way. The question is, therefore, both a sanitary and a commercial one, the combination of which being a main cause of the difficulties in securing satisfactory results.

The increasing cost of food, whether justly or not, will bring about a more careful study of food values to determine what quality of food is best suited for the different occupations of man, and to determine what quantities of each kind of food are necessary to produce the desired effect in each case. Research both in America and Europe in the field of metabolism is making progress towards this end. The transportation of food is another question that here and there needs more satisfactory answers; such as the best means of bringing food, especially milk, meat, eggs and fruit, from the source to the table. The transportation of fruit packed when in a ripe condition is still largely unsatisfactory. We must yet know more concerning the differences in the physiological effects between the consumption of fruit picked when ripe and the consumption of fruit picked when unripe and which is now too frequently sold in the markets. In the meantime refrigeration cars and ships are used to overcome some of the troubles. How much can be done in these matters, is indicated by the milk industry, particularly in the eastern part of the United States, where it has reached a height both in quality and safe distribution never reached before in any country.

The adulteration of foods should also come in for a word. The question is generally divided between the evils of poison and of fraud. It is rarely the former, and among the latter there are cases where the addition of a preservative may be harmless to health and a great advantage in transportation. The subject still needs a convincing presentation based upon unquestioned facts. The screening of foods against flies is making good progress in this country. The practice should be encouraged by educa-

tional means and by law. The application of hygienic laws to the conditions existing at markets and slaughter houses is better enforced as a rule in western Europe than here. We should endeavor to improve them and reach at least the same high plane.

The public health aspects of good *illumination* in closed spaces, and particularly in working rooms, are beginning to be appreciated and studied; also the effects of good *acoustics* in school rooms and lecture rooms. Both are well worthy of more attention than they have heretofore received.

Public health is also affected by means of public *conveyance* within a town. It may be that a person recovering from an infectious disease, though not beyond the point of transmitting infection, occupies a public conveyance and transmits the germs to his neighbor or to a person later occupying the same seat. Disease has been frequently communicated in this way. We are still deficient with our precautions in this matter. The frequent change of passengers in the street cars seems to make precautions extremely difficult. It is a question that, on account of this difficulty, deserves more attention than it has received.

Street cleaning concerns public health chiefly on account of the dust created by city activity, which settled upon the surfaces of the streets. This dust cannot all be removed by sweeping. A heavy rain washes it into sewers. Between such rains it is now found best to remove it by water flushing. Only a few cities in America have as yet a satisfactory system of street cleaning equal to that of western Europe.

River cleaning is another subject which is rising up to receive attention by the public health service. Rain water washes dirt and dust into the rivers and much of it deposits and remains at the bottom. When sewers discharge into rivers much of the heavier matter settles. Much of the deposited matter putrefies.

The opinion is gaining that rivers should be kept as clean as streets, our thoroughfares on land. For this reason it is urged to keep from entering our rivers all offensive material that can be excluded. It is, likewise, urged to regularly remove from river beds, in populated districts, such settlements and putrefactive matter, which it is not practicable to prevent from getting into them through the surface washing effects of rainfalls.

The *disposal* of the *dead* now and then revives discussions of preference as to the best ways and means of accomplishment, but without final conclusions. In civilized countries burial still prevails. In modern times cremation seems to be gaining many advocates. Desiccation of the body, once a promising modern sanitary innovation, having sentimental and legal advantages, has lately not been revived. From a public health standpoint there is little difference between the three customs, if each one is properly conducted.

Sewage disposal has of late received a material advance which now makes

it practicable to collect, convey and dispose of a city's waste waters without necessarily causing any nuisance at any point. This advantage is obtained by producing, on the one hand a rapid flow without deposits, from the points of origin to the points of delivery, and on the other, a decomposition under several pounds of water pressure, and without putrefaction of the solids settled out from the sewage; and by producing an oxidation of the remaining liquids while percolating through certain porous materials.

While in this manner all nuisances can be prevented, public health service must still be watchful of the pathogenic bacteria which may pass through such works. These may now be destroyed in the effluent by disinfection.

In the disposal of sewage a distinction should be made between giving it simply a treatment or a purification. The latter generally requires expensive means and is often unnecessary, particularly when the effluent enters a stream which contains water that cannot be kept pure, and when some moderating treatment is sufficient.

The sanitary disposal of *solid city refuse*, since the American Public Health Association made its report some eight years ago, has not advanced materially, except by improved machinery and a better understanding of the details of the subject. Both Europe and America are agreed that different methods of disposal are practicable, according to the different local conditions. It is also agreed that the cost of collection is a controlling factor, and that, other things equal, the combined cost of collection and disposal should generally decide the preference between the several available methods.

The best of these methods, so far as the most objectionable parts of the refuse are concerned, may be stated to be:

First, a separate collection of garbage, its reduction to grease and fertilizer; and a separate collection of the rubbish and the incineration thereof.

Second, the combined collection of all refuse and its incineration, with the production of steam.

From a public health standpoint both methods are unobjectionable, if the collection of the garbage is prompt and proper, and the operation of the disposal works is careful and efficient.

5. *Railroad, Navigation, Army and Navy Hygiene.*

A few more groups of applied hygiene were mentioned as being the means of transportation over land and water, and the army and navy hygiene. Time does not allow us to enter upon these wide fields. They are being explored in some directions quite thoroughly and good advances have been made. But more remains to be done.

On railroads we have the chief question of car hygiene, the most healthful arrangements for day coaches and sleeping cars, their ventilation, heating

and disinfection. The Pullman Company has already taken a number of precautions which apparently are satisfactory. On large steamships we have similar precautions.

The best class of cars and steamers are, as a rule, hygienically fairly satisfactory, but the average cars, steamers and sailing vessels, and particularly those below the average, in the attention given to cleanliness, are more or less in need of improved arrangements.

We have now reached the end of the subjects of applied hygiene. It is a large field, a very important field, and one which has as yet been but partly explored. It should, therefore, be the duty as well as the desire of the members, by committee or otherwise, to help in the exploration of the unknown parts and to find solutions for the unsolved problems.

We have, first, hurriedly considered the hygienic data required to furnish the foundation for the many subjects of applied hygiene. We have then briefly considered also these subjects themselves.

It remains now to briefly mention two more branches of the general topic of this address which indicate the means by which the public may reap the greatest benefit from the conclusions reached by the above mentioned scientific and practical health work.

One is bringing about a better education on health matters; the other is securing legislation which will enable the conclusions concerning public health service to be better carried into effect.

III. HYGIENIC EDUCATION.

Hygienic education is one of the mainsprings of the present movement to improve public health. When it becomes generally known and appreciated that the diseases which cause over one half of our deaths are and will be preventable, and when the people learn how such ailments can be prevented or cured, they will rise up and demand these benefits.

Let me quote from an address by the first president of the American Public Health Association, Dr. Stephen Smith, of New York, delivered at its first annual meeting forty years ago:

"The general facts of physiology and pathology should be taught in all our schools, from the infant class of the primary school to the senior class of the literary colleges. . . . These studies are not too abstruse for the young. . . . The child of 10 years can comprehend the acts of digestion and assimilation, the structure of the lungs and the method of respiration, the anatomy of the heart, etc. . . . Older pupils will comprehend the more involved pathological processes. . . . Were a well digested system of education in matters which so vitally concern the well-being of every person, adopted and put in practice, with anything

like the vigour with which we insist upon the study of the common and useful branches, and the uncommon and ornamental branches, within one generation the whole mass of the people would be so enlightened on subjects relating to the hygiene of every day life that our average longevity would be immeasurably increased."

Education, as here suggested concerning our body, its structure, its physiology and hygiene, if begun in our lowest classes and convincingly effected by attractive illustrations in the most modern way, dynamic as well as static, by exhibition, by descriptive popular lectures and bulletins on the preservation of health and the prophylaxis of disease, will do more to improve public health than almost any other single means yet attempted.

No more convincing occasion to prove the general interest of the public in matters of public health could have been found than the Exhibition of Hygiene in Dresden in 1911. The principal building was intentionally educational. If we judge by the attendance, which during parts of the day had to be limited to admission by relays on account of the crowds of plain people desiring entrance, no exhibition ever achieved a greater success.

By thus popularizing practical scientific knowledge we will effectually cast upon the desert the many fakes which still have a hold upon so many of our people.

A campaign of hygienic education seems to be one of the most important of all duties in the effort to improve public health. A section created for the purpose of first developing the most rational plan of procedure, and then the best means of carrying it out, should be of great benefit. Our JOURNAL, of which I shall presently say a word, can be an admirable means to forcibly assist in this cause.

IV. HYGIENIC LEGISLATION.

In the first report of the American Public Health Association in 1873, its secretary, Dr. Elisha Harris, said: "Sanitary officers of health have to perform their duties under laws which in most states are not worthy of an enlightened people. A sanitary system worthy of the present state of the physical sciences and of hygiene, hardly has existence in any of our states."

Since then, the laws in a number of states have been improved, although some are still crude and unjust, and are either ineffective or accomplish the reverse of what is desired. No laws should be passed until they have been approved by scientific, practical and executive public health men, by such that have had the necessary experience in the special fields to be covered. Too often laws are based on old precedents, ignoring the facts of recent progress. Laws may have been just and proper a generation ago in Europe but at present they may be wholly unjust and improper under the new conditions now facing us on the North American Continent.

Enthusiasts in the public press often talk about health measures as though their purpose could be fulfilled simply by passing any kind of a law. Such laymen forget, first, the large amount of positive knowledge and training that is a prerequisite to efficiently carry out a definite and just procedure that will affect an entire community, and, secondly, the amount of money required to carry out the measures which they believe will solve all difficulties.

Laws should not be enacted without having their substance, their flesh and blood, suggested and approved by the best available specialists, leaving it to the legal profession to suggest and fix their framework and the external protection against illegality, so that the new law while allowing the fullest freedom of action along all lines of possible progress, will be competent to secure justice to all interests concerned, will be efficient to carry out the intent, and prevent an ingress of disturbing elements which might become antagonistic to its purpose.

In order to put any conclusions that may be reached by the American Public Health Association into practical use, we need, it seems to me, also a committee on legislation, to take the necessary steps to suggest and urge the passage of laws which embody those conclusions.

We need above all at the present time, the legal extension of the registration of vital statistics throughout the country. We need better laws in many states regarding the control of infectious diseases, infant mortality, disease carriers and eugenics, and, in fact, also through the entire list of applied hygiene.

V. THE JOURNAL.

During the past year our JOURNAL has improved favorably under the conscientious supervision of the Committee on Publication and the able editorial staff. Its contents consisted largely of the papers read at the last annual meeting in Washington, but a number of new articles on live topics were added. A new feature, and one which it seems to me is specially valuable, and should cause the issues to be awaited with eagerness and read with satisfaction, is the division modestly placed at the end, called "Health Department Reports and Notes." No other monthly publication gives, as news matter, a better account, more carefully selected and edited, of the more important public health matters in America. It is hoped that this division and others can be still further developed, enlarged and extended. The external appearance of the JOURNAL is creditable to the association and to those who are directly responsible for it.

If this association vigorously pursues the campaign of education in a popular and effective manner, and endeavors to spread the most essential and convincing facts among our people, our JOURNAL would, it seems to me, be one of the best assistants through which to accomplish it.

VI. CONCLUSION.

To draw a few general conclusions from the foregoing presentation, let us recall how, from a small beginning among the ancients, the public health movement has grown, first slowly, then rapidly, and has now reached large dimensions; how this growth has proceeded *pari passu* with the growth of pure science in general, and of medical science in particular; and how closely the public health service is allied to applied science, with which it is constantly advancing and through which it receives its practical realization.

The interest in this health movement is also spreading broadly, not only among the more educated but among the plain people, as soon as they are given the opportunity of learning plain facts about the preservation of their own health and of the health of their families.

With the greater expansion of the public health service came greater ramifications and complications, resulting in the demand for still larger and more complex health departments. The intimate relationship between city and country and between cities themselves, soon required state or provincial boards of health. Soon after this step the expanding relationship between the states themselves and between the home country and foreign countries finally required national health authorities.

In 1808 Prussia established a Royal Board of Health, as a bureau under the Secretary of the Interior. In 1876 Germany founded its Imperial Board of Health, consisting of physicians, engineers and lawyers, acting chiefly in an advisory capacity, and subdelegated to the Department of the Interior.

France, since the middle of the last century, has had a Consulting Committee on Public Health, made up of physicians and engineers, and subdelegated to the Secretary of the Interior. It has lately been proposed to create a department of public hygiene, its president to have a seat in the Cabinet.

England had a general board of health established in 1848. In 1871 it was embodied in the new Local Government Board, an administrative department of the United Kingdom, the president being a member of the Cabinet.

Canada has lately been agitating the question of organizing a national Department of Public Health, the presiding officer to be a member of the Cabinet.

The United States has a Public Health and Marine Hospital Service, delegated to the Treasury Department. It has done the pioneer work of the public health service in the United States, has an excellent force, is expanding and will no doubt remain the nucleus of every further development towards an independent administrative department.

Mexico has a very efficient Superior Board of Health, with powers extending over the entire country, for which it has done excellent service in public health protection.

Cuba is the only country in our association which already has a national Department of Public Health and a Minister of Public Health with a seat in the Cabinet.

When we contemplate the evolution of the public health service in the older countries, it seems clearly in the line of natural development that the administration of the public health affairs of a country should be delegated to an independent administrative department, presided over by a Cabinet officer. It does not seem difficult to foresee that it can only be a question of time when such a national department of public hygiene will be established in the government of every civilized land.

No service could have more justification for its existence than one which establishes the means for improving the physical and mental health of the people.

No service could be more important to the industrial and political life of a country than that which maintains good health by which the human creative and producing forces of a country can best develop.

No service could more efficiently control the factors operating over an entire country, which affect the health of its inhabitants, than that of a public health department.

As will appear from what has been said, the work which this association has before it, is extensive and complex. In order to accomplish results not only much time and work are required, but this time and work must be efficient.

In large associations efficiency is obtained only by subdivision into committees and sections. The International Medical Congress which lately met in London has a wide range of medical subjects, but no wider than that of public health. It has thirty-two sections and subsections, while we have far less.

To accomplish the work which seems to lie in the path of destiny for this association to do, it appears that the number of sections and committees should be materially increased. This narrows the field for each one and permits the applied forces to be more effective. An increase of committees, besides helping to intensify the work, would also accelerate it, and correspondingly multiply the results.

The fact that other associations are taking up more or less intensely some of the special phases of public health is no reason why they should here be excluded. The name of this association embraces all phases of public health. Its main purpose is to establish harmony among the many subjects. Each one should be considered as a part of the whole and elaborated only so far as its relation to the whole demands. It should be a

clearing house. But the function of a clearing house in the public health field brings with it the further necessity of establishing a permanent headquarters, adequately manned, for the conduct of the association's business, which must continually grow, if it is to fulfill its duties. I trust the association will give such a proposition due consideration, as well as the allied one of providing adequate financial support.

The chief factors which accomplish results in committee work are a systematic procedure and persistent devotion to the cause. The motive power producing this devotion must be the conviction that valuable results can be accomplished, and that both research and faithful coördination of all known facts will furnish the data, the inductions from which will solve the problems of applied hygiene.

No association can have a higher aim than ours, because it endeavors to point out the ways and means to save lives, to provide better sanitation and to furnish greater comforts of living.

And no association can give to its members a stronger personal incentive for effective work, if we realize that "life saving is the highest and noblest of pursuits," and that "good health is our greatest gift on earth."